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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER				
BARTON, JEFFREY THOMAS				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/727,988

Applicant(s)

KONDOH, YOSHIOMI

Examiner

Jeffrey T. Barton

Art Unit

1795

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 June 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 and 28-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-25 and 28-34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-8508)
- Paper No(s)/Mail Date _____

- 4) ☐ Interview Summary (PTO-413)
- Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 23 June 2008 has been entered.

Response to Amendment

2. The amendment filed on 23 June 2008 does not place the application in condition for allowance.

Status of Rejections Pending Since the Office Action of 22 January 2008

3. All rejections are maintained.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claim 34 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which

was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. There is no support for the new limitations to "two first electric conductor members with a same Seebeck coefficient" or "two second electric conductor members with a same Seebeck coefficient" as recited in new claim 34.

There is also no support for an arrangement wherein the two first or two second semiconductor materials are arranged in series without an intervening material having a different Seebeck coefficient. It appears the claim is directed to an embodiment as shown in Figure 2, for example, which requires an electrical conductor connecting two elements of a common type. Such metallic conductors have Seebeck coefficients that are different from conventional thermoelectric materials. Applicant provides no teaching of series connection without such a conductor, nor is it clear that this would be possible. Therefore the specification does not support the claim as currently recited.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States

only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1-4 and 34 are rejected under 35 U.S.C. 102(b) as being anticipated by Bijvoets (U.S. 5,006,178).

Bijvoets discloses a thermoelectric device as shown within the FIGURE.

Regarding claim 1, the figure shows two thermoelectric converter elements (leftmost side of figure, the top and bottom combinations of p and n), each of which is formed to join a first electric conductor and a second electric conductor having different Seebeck coefficients from each other (the first conductors are the p blocks, the second conductors are the n blocks; the joint member for the top element is either element 5 or element 3, the joint member for the bottom element is element 2) and an electric conduction material, 9, electrically connects the sides of the first conductors opposite the joint members and electrically connects the sides of the second conductors opposite the joint members. Bijvoets discloses passing electric current through the device to obtain a temperature difference, making an endothermic and exothermic section with a distance between sections and the required temperature condition of the claim (column 1, paragraph 5 and column 3, lines 56-64).

Regarding claim 2, the figure shows $2n$ pieces of thermoelectric converter elements (the top and bottom combinations of p and n), each of which is formed to join a first electric conductor and a second electric conductor having different Seebeck coefficients from each other (the first conductors are the p blocks, the second conductors are the n blocks; the joint member for the top elements is either element 5 or element 3, the joint member for the bottom elements is element 2) the elements

adjacent to each other being disposed alternately and an electric conduction material, 9, electrically connects the sides of the first conductors opposite the joint members and electrically connects the sides of the second conductors opposite the joint members in such a manner as to form an in-line. Bijvoets discloses passing electric current through the device to obtain a temperature difference, making an endothermic and exothermic section with a distance between sections and the required temperature condition of the claim (column 1, paragraph 5 and column 3, lines 56-64).

Regarding claim 3, the figure shows two thermoelectric converter elements (leftmost side of figure, the top and bottom combinations of p and n), each of which is formed to join a first electric conductor and a second electric conductor having different Seebeck coefficients from each other (the first conductors are the p blocks, the second conductors are the n blocks; the joint member for the top element is either element 5 or element 3, the joint member for the bottom element is element 2) and an electric conduction material, 9, electrically connects the sides of the first conductors opposite the joint members and electrically connects the sides of the second conductors opposite the joint members. Bijvoets discloses creating an electric current with the device when a temperature gradient is placed across the device, making a high temperature side and a low temperature side with a distance between sides and the required temperature condition of the claim (column 1, paragraph 5 and column 3, lines 56-64).

Regarding claim 4, the figure shows $2n$ pieces of thermoelectric converter elements (the top and bottom combinations of p and n), each of which is formed to join a first electric conductor and a second electric conductor having different Seebeck

coefficients from each other (the first conductors are the p blocks, the second conductors are the n blocks; the joint member for the top elements is either element 5 or element 3, the joint member for the bottom elements is element 2) the elements adjacent to each other being disposed alternately and an electric conduction material, 9, electrically connects the sides of the first conductors opposite the joint members and electrically connects the sides of the second conductors opposite the joint members in such a manner as to form an in-line. Bijvoets discloses creating an electric current with the device when a temperature gradient is placed across the device, making a high temperature side and a low temperature side with a distance between sides and the required temperature condition of the claim (column 1, paragraph 5 and column 3, lines 56-64).

Regarding claim 34, Bijvoets teaches a device in which two first electric elements 8 are arranged in series in an electrical circuit as claimed without an intervening said second thermoelectric converter element having a different Seebeck coefficient that the first electric conductor member, and wherein two second electric conductor members 10 are arranged in series without an intervening said first thermoelectric converter element. (Figure)

8. Claims 1-4 are rejected under 35 U.S.C. 102(e) as being anticipated by Venkatasubramanian et al. (U.S.P.G.Pub 2003/0230332).

Venkatasubramanian discloses a thermoelectric device as shown in figures 4, 5 and 6.

Regarding the claims, Venkatasubramanian discloses the device can be used for both thermoelectric cooling, passing current through the device to create endothermic and exothermic areas, and power generation, taking out an electrical potential from high temperature and low temperature sides (paragraph 0050). The parallel wiring configuration of figure 6 meets the claim limitations for the configuration of the elements. Within the figure, the p and n elements are joined by the joining members on heat pipe 64 and then the opposite sides of the elements are electrically connected to each other by wiring 66 and 67. Further, the figure shows multiple p and n elements wired together in-line as required by claims 2 and 4.

Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bijvoets as applied to claims 1-4 and 34 above, and further in view of Yoo (U.S. 6,271,459).

The disclosure of Bijvoets is as stated above for claims 1-4 and 34.

The difference between Bijvoets and claim 5 is the requirement of multiple energy producing devices from different heat sources.

Yoo teaches using multiple thermoelectric devices to produce electricity from multiple heat sources as in figure 3.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize multiple thermoelectric devices and multiple heat sources as in Yoo for the thermoelectric devices of Bijvoets because the additional devices and heat sources help create more electricity and are well known in the art to increase power production by using multiple devices/sources. Because Bijvoets and Yoo are concerned with thermoelectric power production, one would have a reasonable expectation of success from the combination. Thus the combination meets the claim.

12. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bijvoets as applied to claims 1-4 and 34 above, and further in view of Pflanz (U.S. 6,100,600).

The disclosure of Bijvoets is as stated above for claims 1-4 and 34.

The difference between Bijvoets and the claims is the requirement of the electrical energy to be used for electrolysis.

Pflanz teaches a power plant system that uses thermoelectric elements among other elements to produce electrical power. The electrical power is utilized for the electrolysis of water into oxygen and hydrogen, thus turning electrical potential energy into chemical potential energy (column 9, last paragraph).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to connect the thermoelectric device with an electrolysis device as in Pflanz for the device of Bijvoets because the production of hydrogen decouples the energy flow from the statistically distributed generation and consumption and allows for a continuous energy flow regardless of outside conditions (Pflanz column 10, paragraph 3). Because Pflanz and Bijvoets are concerned with thermoelectric energy production, one would have a reasonable expectation of success from the combination. Thus the combination meets the claims.

13. Claims 8, 9, 11, 12, 14, 15, 17, 18, 20, 21, 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bijvoets as applied to claims 1-4 and 34 above, and further in view of Kim et al. (U.S. 5,987,891).

The disclosure of Bijvoets is as stated above for claims 1-4 and 34.

The differences between Bijvoets and the claims include the following: while Bijvoets discloses both the thermoelectric effect devices and energy conversion devices of all the claims, Bijvoets does not disclose using multiple devices connected together in

the manner of the claims; Bijvoets does not disclose the use of a switch to control feedback of power; and Bijvoets does not disclose using a switch to cut power from a direct power source of the thermoelectric device.

Kim teaches a refrigerator/warmer as shown in figure 1 that utilizes two sets of thermoelectric elements to produce power and produce a temperature gradient. The first set, elements 3, 4 and 5, produce an electric current from a temperature gradient between the inside and outside of the unit. The second set, element 6, utilizes power from the first set to create a temperature gradient between the inside and outside of the unit. For example in heating applications, units 6 heat the inside of the box causing elements 3, 4 and 5 to produce electricity from the temperature created by unit 6, which is then returned to power unit 6.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the configuration of Kim with the thermoelectric devices of Bijvoets because the configuration allows for cooling/heating while utilizing the temperature gradient created to supply the power, thus saving on power consumption and the devices of Bijvoets have enhanced efficiency (3 times as high as standard thermoelectric devices) for such a combination due to the distance created between the hot and cold sides (Bijvoets column 5, example I). It would have been further obvious to one of ordinary skill in the art at the time the invention was made to utilize switches to control the flow of electricity or external voltage sources in the startup phase of the combination because these elements are well known in the art for electrical control and the running of processes under startup conditions. Because Bijvoets and Kim are

concerned with thermoelectric devices, one would have a reasonable expectation of success from the combination. Thus the combination meets the claims.

14. Claims 10, 13, 16, 19, 22, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bijvoets in view of Yoo as applied to claim 5 above, and further in view of Kim et al. (U.S. 5,987,891).

The disclosure of Bijvoets in view of Yoo is as stated above for claim 5.

The differences between Bijvoets in view of Yoo and the claims include the following: while Bijvoets in view of Yoo discloses both the thermoelectric effect devices and energy conversion devices of all the claims, Bijvoets in view of Yoo does not disclose using multiple devices connected together in the manner of the claims; Bijvoets in view of Yoo does not disclose the use of a switch to control feedback of power; and Bijvoets in view of Yoo does not disclose using a switch to cut power from a direct power source of the thermoelectric device.

Kim teaches a refrigerator/warmer as shown in figure 1 that utilizes two sets of thermoelectric elements to produce power and produce a temperature gradient. The first set, elements 3, 4 and 5, produce an electric current from a temperature gradient between the inside and outside of the unit. The second set, element 6, utilizes power from the first set to create a temperature gradient between the inside and outside of the unit. For example in heating applications, units 6 heat the inside of the box causing elements 3, 4 and 5 to produce electricity from the temperature created by unit 6, which is then returned to power unit 6.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the configuration of Kim with the thermoelectric devices of Bijvoets in view of Yoo because the configuration allows for cooling/heating while utilizing the temperature gradient created to supply the power, thus saving on power consumption and the devices of Bijvoets in view of Yoo have enhanced efficiency (3 times as high as standard thermoelectric devices) for such a combination due to the distance created between the hot and cold sides (Bijvoets column 5, example I). It would have been further obvious to one of ordinary skill in the art at the time the invention was made to utilize switches to control the flow of electricity or external voltage sources in the startup phase of the combination because these elements are well known in the art for electrical control and the running of processes under startup conditions. Because Bijvoets in view of Yoo and Kim are concerned with thermoelectric devices, one would have a reasonable expectation of success from the combination. Thus the combination meets the claims.

15. Claims 28, 29, 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bijvoets in view of Kim as applied to claims 8, 9, 11, 12, 14, 15, 17, 18, 20, 21, 23 and 24 above, and further in view of Pflanz (U.S. 6,100,600).

The disclosure of Bijvoets in view of Kim is as stated above for claims 8, 9, 11, 12, 14, 15, 17, 18, 20, 21, 23 and 24.

The difference between Bijvoets in view of Kim and the claims is the requirement of the electrical energy to be used for electrolysis.

Pflanz teaches a power plant system that uses thermoelectric elements among other elements to produce electrical power. The electrical power is utilized for the electrolysis of water into oxygen and hydrogen, thus turning electrical potential energy into chemical potential energy (column 9, last paragraph).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to connect the thermoelectric device with an electrolysis device as in Pflanz for the device of Bijvoets in view of Kim because the production of hydrogen decouples the energy flow from the statistically distributed generation and consumption and allows for a continuous energy flow regardless of outside conditions (Pflanz column 10, paragraph 3). Because Pflanz and Bijvoets in view of Kim are concerned with thermoelectric energy production, one would have a reasonable expectation of success from the combination. Thus the combination meets the claims.

16. Claims 30 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bijvoets in view of Yoo and further in view of Kim as applied to claims 10, 13, 16, 19 and 25 above, and further in view of Pflanz (U.S. 6,100,600).

The disclosure of Bijvoets in view of Yoo and further in view of Kim is as stated above for claims 10, 13, 16, 19 and 25.

The difference between Bijvoets in view of Yoo and further in view of Kim and the claims is the requirement of the electrical energy to be used for electrolysis.

Pflanz teaches a power plant system that uses thermoelectric elements among other elements to produce electrical power. The electrical power is utilized for the

electrolysis of water into oxygen and hydrogen, thus turning electrical potential energy into chemical potential energy (column 9, last paragraph).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to connect the thermoelectric device with an electrolysis device as in Pflanz for the device of Bijvoets in view of Yoo and further in view of Kim because the production of hydrogen decouples the energy flow from the statistically distributed generation and consumption and allows for a continuous energy flow regardless of outside conditions (Pflanz column 10, paragraph 3). Because Pflanz and Bijvoets in view of Yoo and further in view of Kim are concerned with thermoelectric energy production, one would have a reasonable expectation of success from the combination. Thus the combination meets the claims.

Double Patenting

17. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

18. Claims 1-25 and 28-34 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-15 of copending Application No. 10/537,357. Although the conflicting claims are not identical, they are not patentably distinct from each other because the plurality of elements within the copending application also meets the requirements of the present invention for 2n pieces (see copending claims 2, 3 and 4).

Response to Arguments

19. Applicant's arguments filed 23 June 2008 have been fully considered but they are not persuasive.

Applicant argues that Bijvoets and Venkatasubramanian fail to teach devices or systems in which "a distance is secured for keeping a temperature T_{α} at the endothermic section and a temperature T_{β} at the exothermic section to keep a relation $T_{\alpha} < T_{\beta}$," as recited in claim 1 (or according to similar recitations in claims 2-4). The Examiner respectfully disagrees. The figures of the references clearly show the distances between what can be called "exothermic" or "endothermic" sections (e.g. plates 2 and 3 of Bijvoets), and thermoelectric devices as taught by the prior art produce or harness a temperature gradient across such sections, meeting the limitations of the claim. Note Bijvoets at Column 3, lines 56-64, for example, or Venkatasubramanian at paragraphs 0042-0045.

Applicant provides no specific arguments against the provisional obviousness-type double patenting rejection, which is maintained.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Jeffrey T. Barton whose telephone number is (571)272-1307. The examiner can normally be reached on M-F 9:00AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.